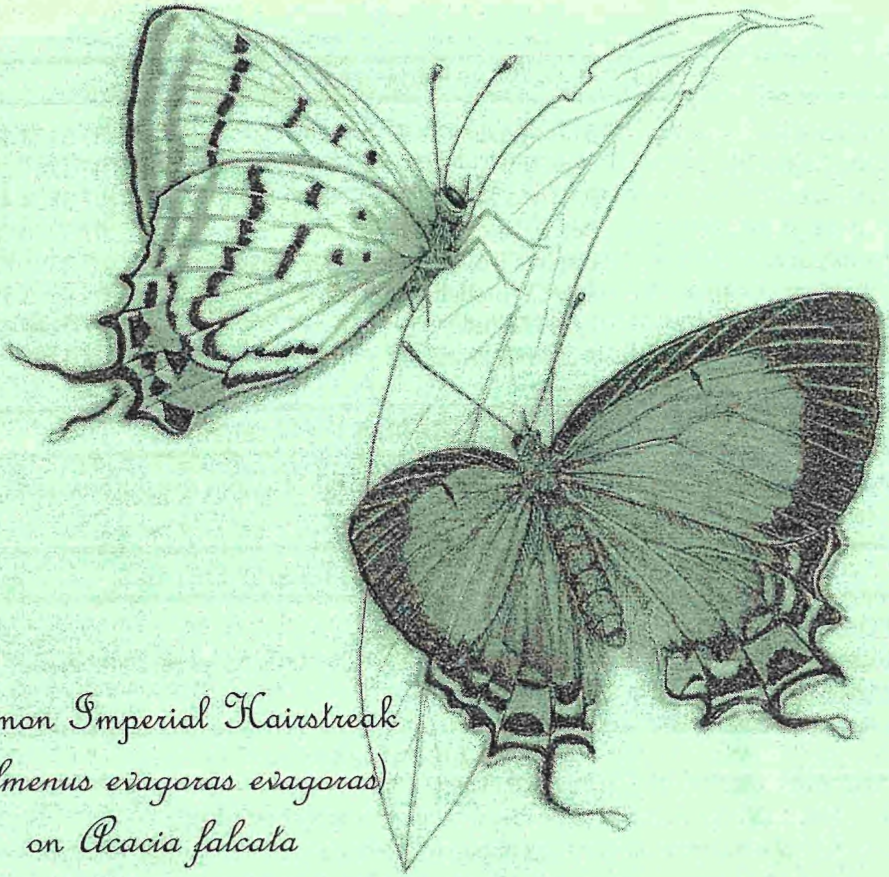

Common Imperial Hairstreak
(*Jalmenus evagoras evagoras*)
on *Acacia falcata*

Butterfly & Other Invertebrates Club Inc. Newsletter

ISSUE NO: 43 DATE: DECEMBER 2006 ISSN: 1326-0006
http://www.connectqld.org.au/boic

Club Planning and Organizing Group - 2006

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Vice President:	John Moss	07 3245 2997
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Excursion Convenor:	Alisha Steward	07 3275 1186

Planning and Organization Meetings

A quarterly meeting is scheduled in order to plan club activities and the newsletter. See BOIC Programme.

Contact Address and Membership Details

PO Box 2113, Runcorn, Queensland 4113

Membership fees are $15.00 for individuals and $20.00 for families, schools and organizations.

Aims of Organization

- To establish a network of people growing butterfly host plants;
- To hold information meetings about invertebrates;
- To organize excursions around the theme of invertebrates e.g. butterflies, native bees, ants, dragonflies, beetles, freshwater habitats, and others;
- To promote the conservation of the invertebrate habitat;
- To promote the keeping of invertebrates as alternative pets;
- To promote research into invertebrates;
- To encourage the construction of invertebrate friendly habitats in urban areas.

Newsletter Deadlines

If you want to submit an item for publication the following deadlines apply:

March issue – February 21st
June issue – May 21st
September issue – August 21st
December issue – November 21st

Cover Drawing

Common Imperial Hairstreak (*Jalmenus evagoras evagoras*) by Lois Hughes

PRESIDENT'S POSTING

In our last newsletter I wrote of our contacts with Brisbane City Council on the issue of removal of mistletoes from trees on footpaths, parks and reserves. Elsewhere in this newsletter you will find a report from John Moss on the successful results of our initiative and I wish to thank John for his work in this area. It is important that we accept Council's offer of further co-operation and to this end I make a special plea that members in the Brisbane area **complete the survey form accompanying this newsletter** and post it to me in the next month. I would like to have the information collated and forwarded to Council by the end of January.

Please take advantage of the offer of seeds from Peter Hendry's seed bank remembering that better germination is likely from fresher seeds.

When I study our membership list, I see that our membership is drawn from a very wide geographical area. For the majority of members, our newsletter is their most significant contact with the club. Members usually submit the newsletter articles. If there is something of interest you would like to share, please "drop us a line". In 2000, Michael Braby wrote "Much still remains to be learned and recorded about the distribution, life histories, larval food plants, behaviour and other aspects of the biology of many species." He was referring to about 400 species of butterflies. If we include approximately 22,000 species of moths, about 1000 species of cicadas, several hundred species of dragonflies and damselflies, umpteen species of ants and spiders, then there is wide scope for each of us to contribute to the body of knowledge already accumulated. Accounts of your observations can be published in our newsletter and thus add to that body of knowledge.

Best wishes for Christmas and the coming year. ***Ross***

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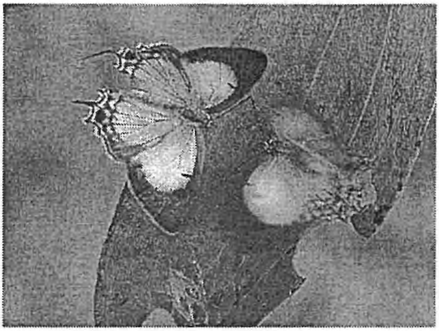
CREATURE FEATURE

Common Imperial Hairstreak (*Jalmenus evagoras evagoras*)

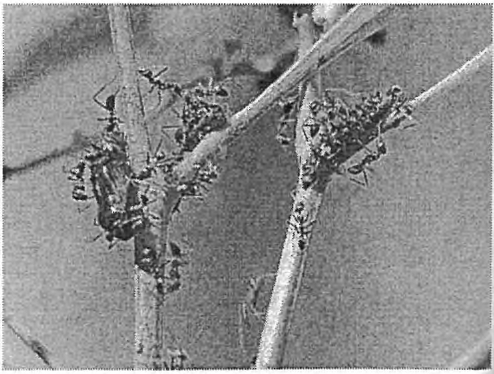
After the Club's April 2006 AGM held at Downfall Creek Bushland Centre in McDowall, those members still present went for a walk along some of the paved tracks through the bushland. One of the fascinating finds was a small colony of larvae of the Common Imperial Hairstreak (*Jalmenus evagoras*) being attended by ants. I did not know it at the time but this was a prelude for what I was going to see the following weekend.



Common Imperial Hairstreak
(*Jalmenus evagoras*)
Actual size – Male 32 mm Female 37mm

Easter, April 14-17, saw me take a return trip to my bush block west of Bundaberg. On Friday afternoon I met with one of my sons and decided to walk up one of the steep ridges on the block. From here I decided to follow a spur to see if I could find a specimen of *Secamone elliptica* (Corky Milk Vine), seen on a previous trip about two years before. I was hoping to collect some seed, as this is the host for the Blue Tiger butterfly (*Tirumala hamata*). On reaching the eastern fence line I realized I had not found it, and one of the reasons was the increase in density of the wattles in the area since my last visit. Using my GPS I set a course for camp, wishing I had used it previously to record the position of the *S. elliptica*.

While climbing out of a gully I noticed a large lycaenid flying around some wattle. Then there were 2, 3, 4! It being late in the day I decided to return to camp. The sighting was near the main track we had used to reach the ridge earlier. This meant I could easily drive back in the morning.



Ants attending larvae and pupae

Back at camp a check of Michael Braby's "The Complete Field Guide to Australian Butterflies" convinced me that I had seen the Common Imperial Hairstreak.

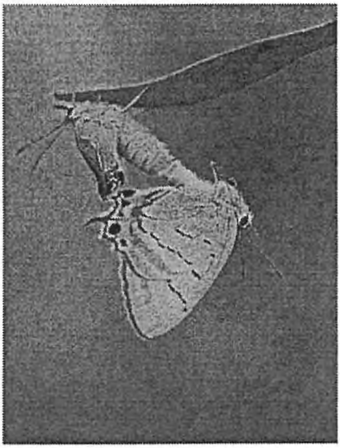
The following morning I drove back up the track to where I had crossed it the previous evening. I saw one flying around a wattle beside the track and, as before, then there were 2, 3, 4, more! But wait! There were 4 or 5 flying around the next wattle and then one up the track, another one down the track and a further one on the other side of the track. They were everywhere!

Mating frenzy

I was standing in about a 10 acre area of wattle with both *Acacia falcata* and *A .leiocalyx* present. There were probably hundreds of Hairstreaks possibly even thousands! Then I noticed the larvae and ants. The ants were in a frenzy, running all over the plants attending the active larvae as well as pre-pupal larvae and pupae. These ants (*Iridomyrmex* sp.) are attracted to the larvae, which, like many lycaenids, have glands which secrete a fluid reward for the caretaker ants. I could not understand why the ants were also attending the pupae with no possible reward. Even pre-pupal larvae probably no longer secrete these fluids.

The ants were not the only creatures in a frenzy. The butterflies themselves were in a frenzy. I did not observe them feeding and in fact there were no suitable nectar sources nearby. Females emerging from their pupae were mating before their wings could expand.

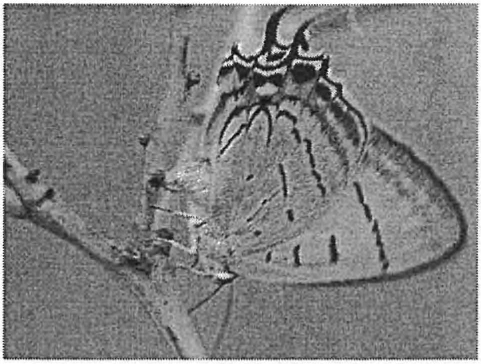
There was vigorous competition between males as to who would mate. Even after they had paired, I witnessed several males flying in unison attempting to separate the pair. Males were inspecting pre-emergent female pupae, and I presumed they were waiting for the females to emerge. Some were set upon by the ants, but seemed not to be too bothered, unless the ants persisted. Then the males would fly off only to land nearby and then slowly re-approach.


Mating with newly emerged female

Some further observations should be made:

- One notable aspect of this colony was that it was on the border of the known northern limit for this sub-species.
- While both species of wattle, *Acacia falcata* and *A. leiocalyx,* were used as hosts, the former seemed to be favoured.
- Looking at the overall picture, many of the wattles had no larvae or ants.

- Some pupae were in clusters of up to 4. Some were in webbing while others had no webbing.
- I observed butterflies rubbing their abdomens along terminal branches. They were possibly depositing a scent to make the ants aware that the trees were being used for oviposition.
- It appears that they emerged mainly in the morning.
- A visit at night showed that the ants were in attendance 24 hours a day.
- One night a cricket was observed running up the stem of a wattle, only to be meet by a delegation of five ants and quickly repelled.



Laying a scent trail

My brother and I, along with John Moss, had been through this area on several occasions and had not seen this colony. I was later to find out why. A subsequent visit in mid June revealed nothing, not even an ant. It was dry and the wattles did not look their best. In early September, I was accompanied by John Moss and Ross Kendall. This time there were a few ants found on the wattles, but no butterflies or larvae. A close inspection revealed several clusters of spent eggs but few viable eggs. There were several old pupal cases of parasitic braconid wasps. A few wasps were observed in the area. In early November, John again accompanied me and my brother to the site. A few ants were found, but no larvae or butterflies were seen. However, back at camp a single Hairstreak was observed on the wing. Thus it would appear that their seasonal occurrence is irregular.

Peter Hendry

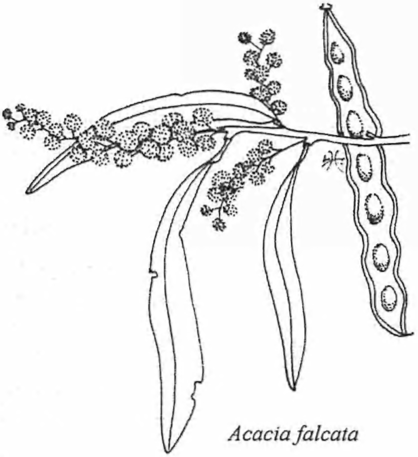
Photos by Peter Hendry

PLANT PROFILE

Sickle-leaf Wattle *(Acacia falcata)*

Acacia (a-KAY-sha) after the Greek name akakia for the Egyptian thorn (*A. arabica*), *falcata* (falcate) sickle shaped, referring to the shape of the phyllodes* (leaves).

Belonging to the Mimosaceae family of flowering plants the genus *Acacia* is the largest genus in Australia with some 1165 species, subspecies and varieties. *Acacia falcata* is a shrub or small tree reaching a height of 4 metres. The grey-green phyllodes measure 9-19cm x 1-4cm, and are arranged alternately along the branches. The pale cream flowers with clumps of 15-20 arranged in a ball, appear in winter. The



Acacia falcata

balls of flowers are arranged in groups of 10-20 along a flower spike extending from the *"leaf" axis. The black seeds occur in a linear pod up to 10cm long.

This plant is host to the Common Imperial Blue discussed in another article and at least one other lycaenid the Short-tailed Line-blue (*Prosotas felderi*), whose larvae feed primarily on the flowers and flower buds.

A. falcata can be propagated from seed, pre-treated with boiling water or rubbed between sandpaper. It prefers a sunny position in well drained soils and is reported to be frost hardy.

* A simple leaf has two parts: the stem or petiole and the expanded portion known as the blade. In the acacias their simple leaf-like structures are modified petioles and are known as phyllodes.

Ref: Australian Plant Genera - James A Baines
60 Wattles of the Chinchilla and Murilla Shires – Grace Lithgow
Flora of South East Queensland vol. 1 – Stanley and Ross
Wattle Acacias of Australia – B R Maslin(coordinator) CD
www.anbg.gov.au/acacia/species/A-falcata

Peter Hendry

EXCURSION REPORT

17th September, 2006 – Visits to members' gardens and flight cages

I just love garden visits! I am always motivated to greater effort and it would seem that other club members also enjoy them as our number had swelled to 20 by the time we got to Peter Hendry's place.

Meeting at John's (Moss) first we took a leisurely stroll around his garden which has much of interest although the pool inhabitants were not interested in putting in an appearance for us to see them.

It was great to connect with members from as far away as the Gold and Sunshine Coasts and to welcome new faces who shared our enthusiasm for the diverse range of insect life and the plants and environment which support them and the other native creatures we encountered here throughout the day.

The absolute highlight had to be the display of white Monarchs, which Anne and Minette Collins of Butterfly Releases had bred - a delightful rarity for us to admire. The normal burnt orange between the black veins was replaced by a milky white faintly suffused with the palest touch of orange in some areas.

We joined a number of extra people at Peter and Bev's enjoying refreshments while seated around the courtyard out back and surrounded by a kaleidoscope of brightly petaled nectar plants in this artistically landscaped area. Refreshed, we then explored the surrounding bushland admiring the extensive additions of host plants Peter had grown in this butterfly and wildlife haven. Strategically placed nametags on these plants certainly added to our knowledge and our appreciation of Peter's dedication and passion for the bush and its creatures.

Although a little early in the season for a lot of butterflies, the yellows certainly brightened up the butterfly enclosure. Of special significance were the larvae of Sword-grass Browns secreted in the leaf folds of *Gahnia.* Outside of the enclosure we did see some Ringlets sunning themselves.

A short drive took us to Richard Zietek's garden, once a grassy paddock with an avenue of Slash Pines but now transformed into a wildlife friendly habitat thoughtfully planted with hundreds of native plants from Everlasting Daisies, Violets and Flannel Flowers to understorey shrubs and trees which will eventually mature into magnificent specimens. Each had special significance to Richard and we spent a considerable amount of time listening and learning while enjoying the journey and gaining an appreciation of the hard work and planning that had developed his garden into such a pleasant place.

Repairs to Richard's butterfly enclosure are nearing completion after previous storm damage. Underfoot were a large variety of shade loving plants and there were still more unusual plant species out the back. There was much lively discussion while we relaxed under the pergola and enjoyed refreshments while we watched native bees industriously working their hive to bring a fitting conclusion to a delightful day.

As we were leaving, I was captivated by the stunning perfumed blossoms of the mature Wisteria snaking its way up a large dead tree and by the *Kennedia rubicunda* smothering a dead log with its rampant growth and large, deep red flowers

If you would like to have us visit or re-visit your garden, please contact Daphne, Alisha or myself.

Lois Hughes

Update on Brisbane City Council Mistletoe issue

Club members will recall that in our last newsletter there was reference to negotiations with the Brisbane City Council aimed at getting the Council to adopt better practices in dealing with native mistletoes in street and park trees. As a result of further correspondence and meetings, we were recently given assurances that there is now a moratorium on mistletoe removal and that Council will be developing new policies on this issue. This is a positive move towards maintenance of biodiversity in our urban environment and we hope that other local authorities and landholders in general will support this initiative.

Council will note (and protect) any specific host tree that Brisbane residents bring to their attention. There is a sheet enclosed in with this newsletter that we urge you to complete and send to Ross Kendall. He will enter the information into a database and forward this to the Council officer in charge of park and street tree operations (currently Keith Foster.) Non-Brisbane members may care to bring the issue to the attention of their own local councils.

John Moss

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The following article is reprinted from the Moggill Creek Catchment Group Newsletter Autumn 2006 with permission from the author.

Unusual aggregation behaviour of the cicada *Psaltoda mossi* Moulds

I am used to swatting mosquitoes after rain as I try to mow the slopes of my steep block at Upper Brookfield but never before did I find cicadas ñ quite large ones – circling my ride-on mower and settling on me as I cut grass! 15 November 2005 was a humid day and at about 1230 hrs while mowing beneath hoop pines (*Araucaria cunninghamii*) more than 30 individuals of an unusual black cicada, *Psaltoda mossi* Moulds, appeared to be attracted to the sound of the mower. When I cut the engine they rapidly flew off but returned again when it was restarted. Both sexes flew about me but those I caught were mostly males.

Marc Coombs (pers. com.) informs me that some species of cicadas can be stimulated to call by the sound of machinery. For example, he noted the Black Friday cicada, *Psaltoda pictabasis* (Walker), began calling in response to a tractor passing nearby at Moree, NSW. Similarly I recall the Red Eye, *P. moerens* (Germar), began calling when a train passed by a property where I lived at Wahroonga, near Sydney.

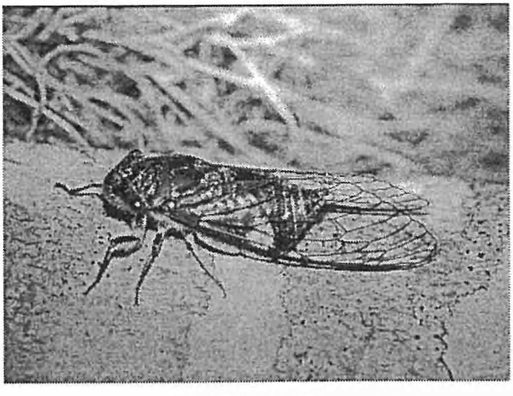
Psaltoda mossi is not usually common in the western suburbs of Brisbane but this year in November they seem to be very abundant. It certainly was a new experience to have cicadas settling on my shirt!

Large cicadas such as *P. mossi* have long life cycles, with immature nymphal stages feeding underground on sap from plant roots, for 6-7 years or more. By contrast their deafening adults live less than two weeks above ground during warmer months. Some years the species can be rare while in other years they appear in unpredictably immense numbers. Almost all male cicadas produce sound, each different according to species and the larger species can be deafening as they call to attract their mates. The males of two very primitive cicadas, the Hairy Cicada, *Tettigarcta crinita* Distant, occurring from the Blue Mountains to Victoria and Tasmanian Hairy Cicada, *T. tomentosa* White, are the only living representatives that produce no sounds.

I am grateful to Dr Marc Coombs, CSIRO Entomology for identifying the species of cicada.

Don Sands

Further comment by John Moss – I first discovered this interesting cicada in dry vine scrub at Lotus Creek, about 100 km north west of Marlborough on the old inland Rockhampton to Sarina stretch of the Bruce Highway, in February 1972.



Psaltoda mossi

It took me some time to convince my colleague, Max Moulds, that this was indeed a new species and not just an ecological form of the similar "Yellow Belly" (*Psaltoda harrisii* Leach). However its habitat, distribution, song and morphology were distinct and, thirty years later, Max formally described it and very kindly named it after me! (see Ref. 1).

The species is highly gregarious, and Don's somewhat amusing article clearly shows this aspect of its behaviour. I have noticed on several occasions that where it occurs it is usually in large numbers and it is often in company with the related "Golden Knight" (*Psaltoda flavescens* Distant) as they share the same habitat.

The general aggregation behaviour, where both males and females come together in large numbers, is not restricted to this species. It is known that a single singing male will attract females, but logically more females should be attracted if the song carries further. Several males singing together in unison can produce a louder sound and thus could attract both males and females from further afield. It is also thought that the sheer volume of the combined song is able to deter bird predators and anecdotally this appears to have some validity (Ref. 2).

It would appear that Don's mower became the focus of an aggregation of "Little Barons" (the name Lindsay Popple and I coined for this species) because the sound of the motor was louder than the combined insect chorus and more specifically it would have to have been emitting at least some of the same frequency components as the cicadas produce with their timbal (sound producing) organs.

Readers who may wish to hear the songs of some of these interesting cicadas can find them on Lindsay Popple's Australian Cicada website (Ref. 3).

References

1. Moulds, M.S., 2002. Three new species of Psaltoda from eastern Australia (Hemiptera : Cicadoidea : Cicadidae). *Records of the Australian Museum* 54(3) : 325-334
2. Moulds, M.S., 1990. Australian Cicadas. N.S.W. University Press
3. Lindsay Popple's website – http://152.98.200.7/ins-info/

Footnote: The derivation of this genus (*Psaltoda*) of cicadas comes from the Greek root PSALTOS, meaning either a song or singer. The Ancient Greeks were very taken with cicadas and looked upon them as harbingers of good.

John Moss

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In Newsletter Issue #41 Martyn Robinson wrote about "Crabby Diners". He has now provided us with instructions on how to construct a tidal tank.

A Beaut King Canute Refute by M. Robinson

I've just done what King Canute couldn't do - albeit on a much smaller scale - I can control the tides!

It was so easily achieved that I'm rather worried that something's going to go wrong any minute but it's been more than 3 years so far - so I'll just keep crossing my fingers and knocking on wood.

The result, of course, is an estuarine tidal tank of 90cm length with a high tide of 17 cm and a low of 8cm. This is slightly modified from a suggested design which Lothar Voigt (Frog & Tadpole Study Group) came up with. Thanks also to the Australian Museum Ichthyology Dept who supplied the reservoir barrel.

Equipment needed:-
A timer switch with at most 30 minutes minimum between one on/off cycle (try Coles or other supermarket).

A small powerhead water pump able to lift water 1 metre (most aquarium shops or garden shops will have them)

One metre of appropriate hose to fit the powerhead (plus any fittings like taps not supplied with the powerhead tho', if new, all is normally supplied in the box)

One meter of aquarium air line tubing .

A 'T' piece and a 'Tap' piece to fit the airline tubing (sold in any aquarium shop)

A plastic barrel/bucket/ or other reservoir of large enough capacity to hold the water that drains off when the tank is in 'low tide' phase - whatever is used must have a lid to prevent too much evaporation.

(NB. This can be another aquarium if you like so while it's high tide in one it's low in the other and vice versa) Whatever reservoir container you use remember that it should be placed below the water level of your display tank as you'll be relying on gravity to do the siphoning for you.

Aquascape your tank so you have made a sloping mud flat or estuarine bank - use bits of drift wood or rock to hold back the sand/mud so it doesn't all level out. I prefer to use actual mangrove mud as it's the best consistency to hold burrows without collapsing - and it has the right odour! Use 'artificial mangroves', and bits of vertically inserted stick to simulate a mangrove area and its prop roots, or else set up for whatever tidal environment you have in mind (e.g. rock pool).

Next determine your low water mark and mark the glass at this point on one of the non viewing sides (or back) of the tank where it will be out of sight. Now make an automatic siphon - easy to do once you've seen it.

One end of the line goes in the water (below low water mark of course) the other end goes in the holding reservoir and you make a loop in the tube and fix this (using duct tape or similar) to the back or side of the tank so the point where the two ends of the loop cross is at the low water mark you made. Now cut thru' the tube end which leads to the reservoir AT THIS POINT and insert the 'T' piece in line so the 'T' is now inverted with the stalk pointing up. Attach a length of air line to this 'stalk' long enough to just reach back into the tank (there should be enough in 1 meter of line to cover all this but it depends on how far away your reservoir is etc). Fix this free end in place just inside the tank but make sure it is open and clear. Now to test out this automatic siphon fill the tank with water to a centimeter or so above your low water mark, briefly cover the free end inside the tank while you suck on the tube end that leads to the reservoir to start the siphon - once it is flowing uncover the free end. The water will now drain into the reservoir until it reaches the 'low tide' mark when it will cease to flow until the water level is higher than your ‘T’ piece again whereupon it will recommence siphoning automatically.

Fix the powerhead into the very bottom of the reservoir - most powerheads come with attached suction cups which makes this easy - I also encase it in a old stocking or something similar to prevent it sucking in too much sand or mud. Make a small hole in the stocking and attach the tubing to the outlet nozzle and run it up into the tank - incorporate the tap somewhere along this line.

Now fill your reservoir with enough water to cover the powerhead and then add the volume of water you want to go in the tank at high tide. Set your timer to the right time and decide when you want high tide - set it 'on' and set the 'off' to come on no more than half an hour later. Plug everything in and at the right time into the tank floods the incoming tide from the reservoir and slowly the water creeps up the 'mud flat' (or whatever set-up you have) - you may need to adjust the incoming flow so that it fills just up to the high tide mark on the half hour and then the powerhead turns off again. In the meantime your automatic siphon will have restarted and will be refilling the reservoir but as it is a much smaller diameter tube the falling tide will take about 5 hours or more - if it is too quick install a tap somewhere along the line and adjust the flow.

Initially I was under the impression that the rising tide should take 6 hours to cover the mud flat but of course if you watch the incoming tide it usually covers a distance of 90 cm in much less than 30 minutes (at least down here – it’s much faster in some places further north!).

Also there seem to be 'zones' on the mudflats where each species hangs out at either high or low tide. So it really only matters to them how long that zone is exposed or covered each day. As a result I currently have 3 tide cycles every 24 hours (8 hourly cycle) for my mud skippers which are of a species which lives within the mangrove root zone. During the falling and low tide they forage on the mud, dig burrows, or chase each other about. As the tide rises and covers this zone they either retire to their burrows or perch in the prop roots like budgies with their tails in the water and wait for the tide to drop again. Whether they NEED these tides is another thing as they seem to live quite happily for years in a tideless tank but sometimes sit around doing nothing for hours (presumably high tide) or hop about feeding and fighting vigorously (low tide?) However this tidal system certainly makes the tank much more interesting to watch and the tides may well be necessary for breeding (which is why I set it up in the first place) Also my high isn't that high as many mudskippers build a walled breeding burrow and the wall is only as high as the high tide so that's what I've aimed for.

Will keep you posted but give it a try – I added a filter in the 'out' siphon line to stop too much mud going into the reservoir when the mudskippers are digging a lot. Apart from occasionally cleaning this filter and checking the hoses don't clog it's really been worryingly easy so far.

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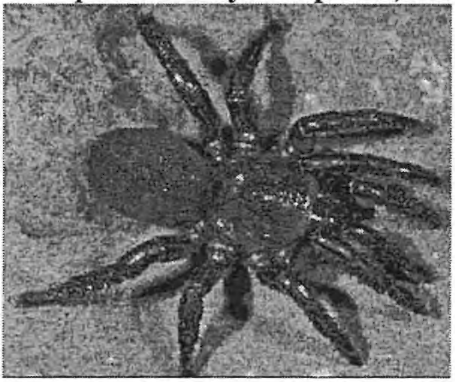
In our last newsletter, Issue #42 September, 2006, Bob Luttrell asked about a spider he had found in his house. Dr. Robert Raven supplied the answer and provided us with this information about the Golden Trapdoor Spider.

Euoplos Family Idiopidae, Golden Trapdoor Spider

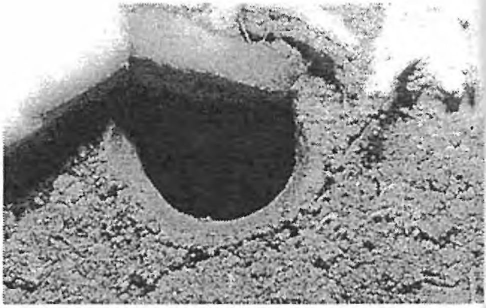


Golden Trapdoor Spider –
Photos supplied by R Raven

These beautiful trapdoor spiders build a short burrow (up to 40cm long) in the ground and on embankments around southern Queensland. They occur also along other parts of the east coast into Victoria and are reported from south-western Australia. The burrow has a characteristic thick, strong plug-like door. The spiders are typically rainforest animals but may also be found in low, dark vine thickets. They are present in the lush rainforests of the south-eastern corner of Queensland and northern New South Wales. Here the thick plug door serves them well in keeping water out during heavy flooding. However, it is unlikely that the plug evolved in response to flooding but rather is merely very useful to those individuals that build in flat parts of the forest. Grand old females of the Golden Trapdoor are occasionally brought in from Brisbane's outer bush-side suburbs.

The carapace (or head) of the spider is a rich golden brown, the legs are stout and darker, and the abdomen (or body) is also dark but sometimes a distinct chevron pattern is evident.

Like most trapdoor spiders, female remain in their burrows most of their lives. The spiders usually hunt insects near the burrow using trip-lines of web attached to the burrow mouth to sense prey. As the spider grows, it enlarges the door and burrow. Sometimes, the previous smaller door can be seen above the present door.



Males generally move in moist conditions, especially in rain. After mating, which presumably occurs in the burrow, an egg sac is laid. The egg sac is cushion-like and is suspended in the burrow by a number of silk lines attached to "corners" of silk extending from the sac. After hatching, the young, which look like small adults, remain in the burrow for an unknown period. The mother remains with them as they rest on the burrow's silken walls. Eventually, the young leave the burrow and move across the ground away from the maternal burrow. Unlike, in the sister genus *Misgolas*, young *Euoplos* do not appear to be very numerous around that maternal burrow. Presumably, the chances of young surviving are better when the earth nearby is soft and easily excavated. The following table gives an indication of when active males are found:

Males in QM database are found in months as:

3	6	10	20	17	3	3	2	1	0	5	6
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Activity begins in summer and climbs to a peak in autumn.

Females are present all year round and live for an estimated 10-12 years. Using an endoscope kindly loaned by Partridge Films, females at O'Reilly's forest in Lamington National Park were studied in December, 1994. At that time, some rain had fallen a week or so before and the soil was damp and invertebrate activity in the litter was high. Of 8 burrows examined, 6 either had a suspended egg sac or young in the burrow; all were found with the endoscope and the burrows were left intact. One gravid female and one presumably sub-adult male were excavated.

Main (1976) incorrectly reports that this is the most common trapdoor spider in south-eastern Queensland. The Brown Trapdoor, *Misgolas*, is far more common and does not build a door to it's burrow.

The bite of these spiders is not known but the sister genus has deeply bitten young men with no ill effects. **Dr Robert J Raven**, Museum Scientist (Arachnology), Copyright Queensland Museum, 2003 (reprinted with permission from Dr. R. Raven)

BOOK REVIEW

Review of the book "Discovering Australian Butterflies – a simple guide to Australia's most common butterflies" and its companion poster by Vanessa Bugg and published by Skyring Creek Books.

Reviewed by John T. Moss

2005 brought us Frank and Helen's "Create More Butterflies", a guide to 48 butterflies of south-eastern Queensland and northern New South Wales aimed primarily at the novice butterfly gardener.

This new 112 page soft-cover publication and its companion poster by Vanessa Bugg, daughter of Sydney lepidopterist John Peters, purports to be a simple guide to Australia's most common butterflies.

I think it is appropriate to include in this review much of Vanessa's introductory notes giving her own rationale.

"*I have written this book because I have two daughters (8 & 10) who are interested in butterflies. They have borrowed every butterfly book from the mobile library that visits their school only to be disappointed that they are still unable to identify the common butterflies on our property. We live on 2.8 hectares in the hinterland behind Noosa on Queensland's Sunshine Coast and we are fortunate that the road reserve beside our property has a small remnant of rainforest. My father, who has collected butterflies for over 50 years, has recorded 85 species of butterfly on our property, during the last fourteen years.*

Butterfly books that are currently available are both too expensive and too advanced for young people or beginners, or they are books that deal with basic butterfly life history without helping to identify the common species. Many of the butterfly books that would be suitable are now out of print and are difficult to find – hence this book.

More than 400 species of butterflies have been recorded from Australia but many of these are rare or localised in their distribution and a special effort would have to be made to see them all. I have selected sixty species as being representative of the most common Australian butterflies that may be seen by young people or beginners. I have used the specimens in my father's collection to illustrate this book and together we have photographed living butterflies and parts of their life history, when the opportunity has presented itself, and these photographs will also help with butterfly identification. Butterflies don't have to be collected to be of interest. They can be observed, reared (and released), conserved and photographed and there is still much to be learned about many aspects of the Australian butterfly biology."

Following this introduction, there are a number of pages describing butterfly anatomy and life cycle in simple terms, butterfly facts and trivia, notes on ant attendance and predators, as well as age-old moth and butterfly differentia! Vanessa then provides a few useful pages on butterfly nomenclature and classification.

Next, there is a very adequate three page glossary, simply and charmingly entitled "Butterfly words," then two pages on attracting butterflies to the home garden which precedes the formal sections on each of the five families (wherein 60 species are discussed).

Then there is an extremely useful seven-page section on the rearing of butterflies, followed by five pages of observation charts for "add it yourself" butterfly observations.

It is good to see the latest taxonomy being used (e.g. that we have three full Birdwing species in Australia) and appropriate currently accepted common names are utilised (e.g. Black Jezebel for Common Jezebel and Large Grass-yellow for Common Grass Yellow).

A feature I like is the (easy to see) section colour coding that incorporates the page numbering and allows for quick finding of each butterfly group. This is particularly useful as there is no general index. In lieu of a formal index there is a tabulation of the 60 species in strict taxonomic order with page numbers given after each listing.

The sixty butterflies chosen were mostly quite appropriate and, as expected, mostly applicable for the temperate and sub-tropical Australian east coast.

My major critical comments are in relation to the set-specimen illustrations. What first hits the eye are the general dullness of colours which is partly due to the use of faded or worn specimens e.g. the Fiery Jewels (on page 79) do not live up to their fiery name and better specimens might have been sourced! The other problem is the shadowing on the wings and consequent lack of sharpness of the images that reduces the morphological detail and aesthetic appeal.

The companion poster uses the same images as the book but life-size and without the shadow outline feature. The images are well balanced and not as cluttered as our familiar Domino poster (now out of print) but contains only one quarter of the number of species. Furthermore the poster size is more conventional, convenient and half the size of the Domino.

A useful scale bar with the exact dimensions of the butterfly appears at the bottom of each species page, but would have been more relevant if positioned just beneath the butterflies inside the image box.

It would have been more useful both for economy of space and for species identification if, instead of just illustrating e.g. an overly large sized male, the available space was used for at least three images – the upperside of both sexes as well as an underside of at least one sex (or both if they differ). This was done with good effect with the Black Jezebel *(Delias nigrina)* but on the page opposite, the Scarlet Jezebel *(D. argenthona)* was illustrated only with a much larger than life female underside.

This inconsistency of illustrations is an important issue for species identification. It is particularly relevant for the three included species – Yellow Albatross, Cabbage White and Caper Gull because of their close similarities. The budding butterfly enthusiast, using only this book, could not be confident in identifying any of these three species.

Some inconsistencies can be a bit irritating. For example, male "sex brands" are mentioned in the text for seven skippers, but helpful line markers illustrating these were used for only five of the seven males illustrated.

With one exception, I found this book and the poster to be relatively free of major errors. It is unfortunate then that the illustration on page 37 of the Greenish Darter *(Telicota ancilla)* is actually a worn specimen of the similar looking Pale Orange Darter *(T. colon)*. Readers who have a copy of the Braby or Common & Waterhouse texts will notice this similarity from the comprehensive illustrations. For those unfamiliar with this difficult genus in the Hesperiidae (or Skipper/Darter family), this is a common mistake, thus the need to have manuscripts/images checked by competent authority. Vanessa's comment in the text (re this genus) of "nine species .... and difficult to separate" becomes quite ironic in view of the case in point! In fact, an earlier butterfly field guide by an eminent South Australian lepidopterist contained five or six inexcusable errors of identification.

Notwithstanding the above criticisms, this book and its companion poster are worthwhile additions to our bookshelves and wall-space. They are well priced at around $30.00 and $9.00 respectively and are fitting companions to the range of butterfly publications currently available.

Editor's note :
"Discovering Australian Butterflies – a simple guide to Australia's most common butterflies" took out the overall Gold medal for Regional Queensland at the recent Printing Industries Craftsmanships Awards.

Both book and poster are available from either the BOIC or from the publisher, Skyring Creek Books, MS 624, Tuchekoi QLD 4570 - Ph (07) 54 855 109 or visit www.australianbutterflies.com.au .The book sells for $29.95 plus postage of $5.00 while the poster costs $9.00 plus postage of $6.00.

AUSTRALIAN NATIVE BEES #8

Stingless Bee Rescues and Transfers - Part 1.

At the time of writing our dear Editor, Daphne is suffering from a broken shoulder so I shouldn't be too hard on her, but she has a lot to answer for. Encouraging me to write a few articles for the BOIC Newsletter was one thing, but later suggesting that I should write a book on stingless bees jolted this old retiree right out of his comfort zone and onto a very steep learning curve indeed. However, that steep, and somewhat rocky path may be coming to an end with 'Australian Stingless Bees – A Guide to Sugarbag Beekeeping' scheduled for publication in the first half of next year.

Consequently I've switched from expanding the previous BOIC Newsletter articles into chapters for my book to condensing segments of the book into these articles. So now that I've concluded this shameless promotion of my forthcoming publication let's take a 'Readers Digest' look at part one of a two-part article on rescuing and transferring stingless bee colonies.

This tree containing a *Trigona carbonaria* colony was marked for removal for a rural fence line. Felling such a tree is not for the faint hearted

Now before I give some advice on rescuing or transferring a colony of stingless bees I should say that felling a tree or even just cutting a nest out of already fallen timber is not for the faint hearted. The process usually requires the use of a chainsaw, wedges and crowbar, often in less than ideal circumstances and while you are being attacked by bees that don't realise you are doing them a good turn. Safety should be your paramount concern and if you are not confident in the use of the necessary tools enlist the help of someone who is.

Now we know they're stingless bees, but they're not biteless. They can deliver a little nip with their jaws and often target the most sensitive parts of our bodies. Dozens of angry bees applying little pinprick bites to the soft skin around your eyes, nose, ears and armpits can certainly distract you from what you are doing. I've seen big brawny 'bushies' driven from the scene of action by 4mm long *Trigona* bees acting in concert. The message here is wear the right gear, which includes a midge veil over a wide brimmed hat. Long trousers tucked into the top of your socks and a long sleeved shirt buttoned at the wrist will complete your bee rescue attire. You may not feature on the cover of a fashion magazine but you'll feel a lot more comfortable and do a better job of the transfer if you are well protected.

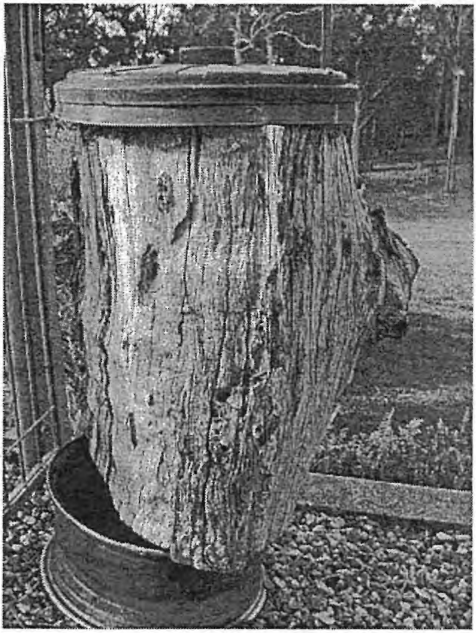
Also consider the bees' welfare in this exercise and plan accordingly. Wet days are not suitable for obvious reasons, but neither are cold days or late afternoons if the temperature is likely to drop to 18 degrees centigrade or lower. The bees simply can't fly at these lower temperatures and will be lost. The brood may also become chilled and die. Ideally transfers from logs to artificial hives should only be done in spring and early summer to give the colony a chance to recover and build up stores before winter. However, with hive rescues you may not have the luxury of being able to pick and choose the best season. The brood is also sensitive to light and heat and should be shaded from the sun at all times. Be gentle with them. A friend of mine once described the transfer of a colony from a log into an artificial hive as a deeply traumatic event for both him and the bees, but both survived the experience.

For readers who may not enjoy the 'hairshirt' experience that comes from the accumulation of sawdust and woodchips in one's underwear while using a chainsaw in the bush there are other ways of obtaining a log containing a stingless bees' nest. Firewood cutters and Tree Loppers often come across stingless bees and can sometimes be converted from apathy to conservation if plied with offers of alcoholic beverages or other inducements.

So whether you've cut down an old hollow tree in the path of the developer's bulldozer or swapped a carton of brown ale for a log destined for the woodcutter's block splitter or chipper you now have to decide what to do with it. If the log is sound and of manageable diameter you may simply choose to leave the colony in situ and transfer the log after dark to your back yard where it will make an interesting garden feature. To do this you will need to cut it to a suitable length, seal up the hive's entrance and any other escape routes and bring it home in the boot of your car or the back of your ute. Just a little hint before you go any further. Mark the top of the log with timber crayon or chalk so that when you are struggling to get it out of your vehicle and up the garden path to its final destination at night at least you will know which end is up. Installing it upside down could be disastrous for the bees inside, particularly for the brood. A piece of foam plastic or rubber stuffed into the entrance will provide a temporary seal, but in hot weather or where you have a long way to travel it may be wiser to use something that allows a little more ventilation for the bees inside. A small piece of shade cloth, fine fly screen mesh or even a piece of nylon stocking taped over the entrance is a better alternative. The open ends of the log above and below the nest will also need to be sealed. Bees may not be in evidence in these cavities at the time of loading the log in your car, but they usually have small access holes into the tree cavity and may escape through these during the trip home. The last thing you need to find when you arrive home, hot and tired is a boot full of angry bees. These cavities in the log can be sealed with the same materials used for the entrance, but if these are not available use a piece of cloth, hessian or simply scrunch up newspaper and stuff it firmly into the hollows.

At home you will need to nail a stump cap or piece of tin on the top of the log to protect the hive from the weather. Plastic flowerpot saucers of a suitable diameter, if inverted, will sometimes do the job quite nicely and can be more attractive than the sheet metal options; but pick a heavy duty ultraviolet stabilised one as you (and the bees) want it to last. If possible install the log so that it is raised up off the ground a little to deter ants, termites and to reduce decay.

If possible choose a site for the hive that is sheltered from strong winds and where it won't experience the extremes of the summer heat or the winter cold. Shade after about 10am in summer is recommended and if this can't be provided naturally by trees or other means consider constructing a small shade cloth cover over the hive. A plant shade house or even a verandah or patio can provide a suitable sheltered spot provided the bees have clear and easy access to the outside. Most stingless beekeepers recommend facing the hive's entrance somewhere within the quadrant North to East despite the fact that in nature hive entrances can be found pointing towards every point on the compass.


This rescued colony is well protected from rain and has been positioned up off the ground away from dampness & to deter ants.

There is another reason for positioning the hive with care. As we may have mentioned before relocating a hive within your yard can be a bit of a pain. This is not simply because of the physical effort required to move a large log, but because the bees fix the location of the hive in their little brains with precision. Apparently they do this with reference to nearby landmarks so moving their nest by just a few metres can result in the loss of many foragers. If for some unforeseen reason a move becomes necessary then the hive should be moved at night to a new location well outside their foraging range and not brought back to the new site in your yard for at least two weeks. Alternatively the hive can be moved each night in very small steps towards the new location. The bees are able to reorient themselves when the hive is moved over a short distance, preferably no more than about 80cms each night.

This is the simplest and easiest way to rescue or relocate a hive. However, sometimes colonies will be found in badly decayed trees that break up when felled or in logs of such dimensions that it may not be possible to transfer them intact. In those cases transferring the colony to an artificial hive becomes necessary. While such a transfer is even more traumatic to bees and beekeeper, there are a number of measures that can be taken to lessen the impact on both parties and increase the chances of success, but more about that in part two.

* * *

Seasons greetings to all. ***John Klumpp***

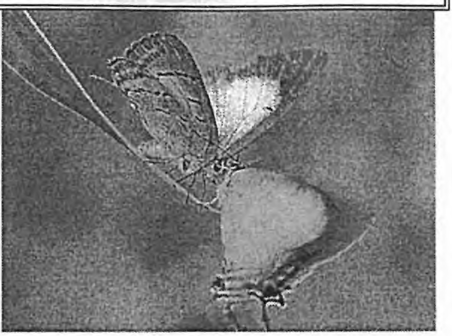
PS. I've got a lot more to thank Daphne for than she has to answer for. Her help and encouragement with the book project have been greatly appreciated.

IN THE GARDEN WITH PETER

Do Butterflies Kiss?

While observing a colony of Imperial Hairstreaks (*Jalmenus evagoras*), on my bush block west of Bundaberg, one of the strangest behaviours seen was two butterflies flying into each other front on. This was seen on more than one occasion. This prompted me to ask the Question "Do butterflies kiss"? I put this question to Don Sands who believes it may be a way of exchanging nutrients.

Peter Hendry



Imperial Hairstreaks (*Jalmenus evagoras)*
Photo by Peter Hendry

LETTERS

Recently Lois received a letter from Mary Hackett who operates a herb farm, Heritage Haven, at Middle Dural NSW. The contents of the letter follows –

"Have just received the latest issue from the Club and decided to drop you and your team a quick note of thanks for putting together such a stimulating magazine. Every time it arrives I carry it around for days like an all-day sucker to sweeten any spare moment. After a few glimpses at the pages I am more aware than usual of all the invertebrates partying just outside my back door.

At present I am supposed to be writing an article on Scented Geraniums but on the way to the Nook I was distracted by all the huge dragonflies darting around my garden. In turn, these winged visitors reminded me of some other inhabitants that I have been wanting to tell you about … *our* stingless bee colony! Don't ask me what variety of bee! All I know is that they are extremely small, winged, fast flyers and non-stinging.

Last year we had to have three old pine trees removed. They were all more than a hundred years old, towering over our little farmhouse and dropping occasional limbs when the wind or inclination blew. It was sad to see them demoted.

The pine nudging the Nook was a lightning-scarred warrior. As the top became airborne the presence of borers cascaded dustily down the remaining trunk, along with an enormous ball of fur that erupted from the centre and scampered down the side of the tree. A huge brush-tailed possum disappeared furiously into the surrounding bush, its enraged plume of tail scattering dust in its wake.

The final pine revealed different secrets. Screened by a jungle of Tacoma, the pine's trunk bore the entrance of a native bee hive … we had often noticed the haze of their swarming in past summers and believed them to be termites. How exciting it was to discover that they were not termites but our own colony of stingless bees! The cherry-picker airlifted the middle segment of the old pine up and over the hedge of Tacoma, depositing the log upright and steady in a shaded part of the garden. A rough lid was attached to the top of the log and within a few days the bees settled down to life on the farm with a different aspect.

Recently there was a long period when the gardens lay cracked and dried beyond past experience and we noticed increased activity around the entrance to the native bee hive. Over a week or so the bees contrived to form a narrow ridge that curved gently over the entrance hole … just like an extended verandah roof. As the days passed, the entrance cover grew. We recalled how ants often erect bunkers around the entrance to their holes before rain starts to fall and we began to wonder if the bees, in similar basic style, could be forewarning a change in the weather.

Well, the rains did come … the hive stayed dry … and the bees have now removed their little orange shelter. Perhaps I should go and ask the bees for future weather forecasts.

Must tell you about last October. It's almost a year ago now, but the sky was clouded for more than an hour as thousands of butterflies migrated across our farm in a N-E direction. White wings bordered with black and patterned below with orange markings, they were an overwhelming sight. I think they were Caper Whites, whose larvae hatch on the native capers. Their mass migration overwhelmed me in the garden as I stood with arms extended, exchanging salutations as they dipped and brushed my hair and fingertips in passing. Do you think this was a one-off or should I keep my eyes open for a repeat performance this October?
Herbally yours,   Mary Hackett"

Ed.: As this letter was written in September I'm wondering if Mary *was* treated to a repeat performance this year.

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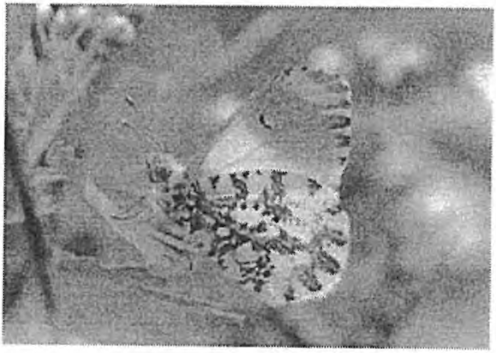
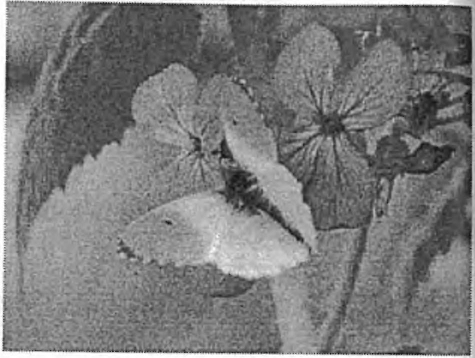
In issue #42 I included a letter from Jon Marshall who had recently visited France and had sent in photos of butterflies he had seen. John Moss and Steve Curle both responded. John thought photo number 1 was the Black-spotted Blue (*Glaucopsyche melanops*) while Steve thought it was a Mazarine Blue (*Polyommatus semiargus*).

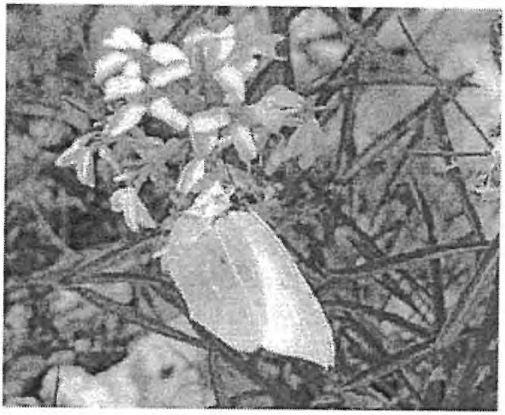
They both agreed that photo number 2 was a Green Hairstreak (*Callophrys rubi*). I have included two more butterflies for identification.

Whites

(1)When flying this caper-white sized butterfly was a spectacular sight of white and orange. When landed (which only lasted a few seconds) marbling on the outer hind wing was also evident. There was a similar species that was yellow and orange rather than white and orange, but alas I was unable to take a good photo if it.







(2) This species looked like a relative of our migrants. It was a pale green colour. There was also either a colour form, sex or related species that looked the same on its outside but the inside forewing was bright orange.

Ed: If you would like to see these photos in colour please email bowden@itconnect.net.au

SEED BANK NEWS

The following seeds are available by sending two 50c. postage stamps to BOIC Seed Bank Curator, 140 Henderson Road, Sheldon 4157, please supply your name and address and which seeds you require.

The following seeds are new additions to the Bank

Acacia concurrens	Blue Jewel (*Hypochrysops delicia*), Emerald Hairstreak (*Jalmenus daemeli*), Common Imperial Hairstreak (*J. evagoras evagoras*), Stencilled Hairstreak *(J. ictinus*)
Cullen tenax	Chequered Swallowtail (*Papilio demoleus sthenelus*), Common Grass-blue (*Zizina labradus labradus*), Tailed Pea-blue (*Lampides boeticus*)
Urtica incisa	Yellow or Australian Admiral (*Vanessa itea*)
Asystasia gangetica #	Blue Argus *(Junonia orithya albicincta*), Blue-banded Eggfly (*Hypolimnas alimena lamina*), Common or Varied Eggfly (*Hypolimnas bolina nerina*), Danaid Eggfly (*H. missipus*), Australian Leafwing (*Doleschallia bisaltide*)

Seeds previously listed

Aristolochia acuminata	Richmond Birdwing (*Ornithoptera richmondia*), Clearwing Swallowtail (*Cressida cressida*), Orchard Swallowtail (*Papilio aegeus*),
Glycosmis trifoliata	Fuscous Swallowtail (*Papilio fuscus capaneus*)
Paraserianthes lophantha	Large Grass-yellow (*Eurema hecabe*), Tailed Emperor (*Polyura sempronius*)
Senna acclinis	Large Grass-yellow (*Eurema hecabe*), Small Grass-yellow (*Eurema smilax*), Yellow Migrant (*Catopsilia gorgophone*)
Senna auriculata #	Common Pencilled-blue (*Candalides absimilis*), Large Grass-yellow (*Eurema hecabe*), Yellow Migrant (*Catopsilia gorgophone*), Small Grass-yellow (*Eurema smilax*), Orange Migrant (*Catopsilia scylla*),

Senna surattensis	Yellow Migrant (*Catopsilia gorgophone*)
Wilkiea huegeliana	Regent Skipper (*Euschemon rafflesia*)

Note: # Exotic
There are only a few *Wilkiea* seeds and they may not be viable. We have had a request for the tiny seeds of the Native Mulberry (*Pipturus argenteus*). Can anybody help? Also if you require any seeds not listed please let us know and we will try to supply them for you. If you have seeds of any butterfly host plants you are able to contribute to the Seed Bank please do so. Peter can be contacted at the above address or phone 3206 0048.

World Wide Websites to Watch

http://www.museum.vic.gov.au/bugs/index.aspx - The Victorian Museum is conducting a programme called Bugs Alive and this site has much information about Bugs.

Ads and Exchanges

Christmas Present Ideas from Lois Hughes (Phone 3206 6229)

Fine art butterfly prints 30x21cm 14 designs. $20.00 each plus postage of up to $2.50
Joseph's Coat moth 31x21.6 cm $40.00 each plus postage of $10.00.
Laced Fritillary butterfly 31x 24 cm $50.00 each plus postage of $10.00.

Back Issues

Back Issues of the Club Newsletter are available at a cost of $2 each plus postage (1-2 copies $1.10 - 3-6 copies $1.50).

Butterfly and Other Invertebrates Club Programme

Planning Meeting

What: Our planning meetings are informative and interesting. As well as planning our activities we share lots of information. All members are welcome as this activity is also a general meeting of members.
When: **Wednesday, 14th February, 6.30pm**
Where: to be advised on RSVP
Contact: Daphne 07 3396 6334 or email bowden@itconnect.net.au to RSVP or for more details

Dragonfly Survey in the Cubberla-Witton Catchments

When: **Saturday, 17 February 2007, 9.00am - 1.00pm**
What and Where: BOIC, Australian Dragonfly Society and Cubberla-Witton Catchments Network joint survey in various catchments location starting at the lagoon in Biami Yumba Park, Fig Tree Pocket (UBD 178 C-H2) and finishing at the Cubberla Creek stretch in Sutling Street, Chapel Hill.
Morning Tea will be provided. Car pooling is recommended.
Contact: For organisational purposes **RSVP** required by **Thursday, 15 Feb**, to Daphne Bowden/BOIC on 3396 6334 or email bowden@itconnect.net.au or Jutta Godwin/CWCN on 3378 1929 or 0407 583 441 or email mail@cubberlawitton.org.

Excursion to Mt Mee, via Samsonvale Cemetery (Ooooooo)

When: **Sunday, 4th of March 2007**
Where and What: Meet at the Cemetery in Samsonvale, not at high noon, but at 10am (Refidex Map 86 F11). The cemetery is at the end of Golds Scrub Lane which runs off Mount Sampson Road (the road from Samford to Dayboro). We'll spend about an hour there. It comes highly recommended as a good place to see lots of different butterflies, other insects, and ghouls. Then we'll head off for lunch and a walk at Mt Mee State Forest. For those with a delicate disposition who wish to skip the cemetery, you can join the rest of us at Mt Mee - we'll be arriving at the Gantry Picnic Area in Mt Mee State Forest for lunch so expect to see us there around midday. Please let Alisha know if you are skipping the cemetery so we can look out for you (and we can give you directions if needed). After lunch we'll head off for a walk or two. There are some good walks, especially one in the rainforest that is surrounded by a clearing. Last time Alisha was there she saw a *Wilkea* sp., and said to Jon "Oooo, a Wilkea! Imagine if there was a Regent Skipper larva on it!" And low and behold, we found not one but many brightly coloured larvae, a first for both of us. Fantastic!
Bring: Hat, sunscreen, walking shoes, lunch and drinks.
Contact: Alisha Steward, 3275 1186 (after hours), 3896 9161 (work), 0402 091 863, jon@escapenet.com.au

More information on Mt Mee State Forest can be found here:
http://www.epa.qld.gov.au/projects/park/index.cgi?parkid=63

If you plan to attend one of the above events, please contact the person indicated in case, for some unforeseen circumstance, the event has had to be postponed or cancelled.

DISCLAIMER

The Newsletter seeks to be as scientifically accurate as possible but the views, opinions and observations expressed are those of the authors. The Newsletter is a platform for people to express their views and observations. These are not necessarily those of the BOIC. If inaccuracies have inadvertently occurred and are brought to our attention we will seek to correct them in future editions. The Editor reserves the right to refuse to print any matter which is unsuitable, inappropriate or objectionable and to make nomenclature changes as appropriate.

ACKNOWLEDGMENTS

Producing this newsletter is done with the efforts of:

- Those members who have sent in letters and articles
- Lois Hughes who provides illustrations including the cover
- Daphne Bowden who works on layout, production and distribution
- John Moss, Martyn Robinson and Robert Raven for scientific referencing and proof reading of various articles in this issue of the newsletter
- Helen Schwencke for conceiving the original idea for a Newsletter

We would like to thank all these people for their contribution.

ARE YOU A MEMBER

Please check your mailing label for the date your membership is due for renewal. If your membership is due, please renew as soon as possible.

Membership fees are $15.00 for individuals and $20.00 for families, schools and organizations.

Would you please advise bowden@itconnect.net.au if you get or change an email address.

Butterfly and Other Invertebrates Club Inc.
PO Box 2113
RUNCORN Q. 4113

M'ship due July 2007

Dr.Michael Braby
Biodiversity Conservation Div, Parks &
Wildlife Service,
N.T. Dept of Natural Resources,
Environment & the Arts
P.O. Box 496
PALMERSTON N.T. 0831

Next event – Dragonfly Survey in the Cubberla-Witton Catchments on Saturday, 17 February 2007 – See BOIC Programme for details